

### REMARKS

This paper is filed in response to the Advisory Office Action mailed January 25, 2008, and is supplemental to the Response Under 37 CFR 1.116 filed December 31, 2007 filed in response to the Final Office Action mailed October 30, 2007.

Claim 30 is added by this amendment. Claims 1-4, 10-17, 29 and 30 are pending in this application upon entry of this amendment.

#### §103 Rejection of the Claims

Claim 1 was rejected under 35 USC § 103(a) as being unpatentable over Chen et al. (U.S. 6,160,311) in view of Jimarez et al. (U.S. 6,407,334).

In the Advisory Action, the Office states

~~Moreover, the applicant's final device 21 or 26 discloses only one microelectronic die and a patterned thermally conductive adhesive layer.~~  
Applicant points out this observation of Figures 21 or 26 is selective and misses embodiments in at least Figures 10, 11, and 24 to teach and claim a “multi-chip module 152, as shown in FIG. 24” (Applicant’s disclosure at page 12). Further, claim 1 states in plain text “*more than one* microelectronic die”.

The Advisory Action next states

In response to applicant's argument that there is no motivation to combine the references, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference, nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See In re Kessler, 942 F.2d 419, 200 USPQ 871 (CCPA 1991).

This is a mere statement of a rule of law but it is not applied to anything regarding Applicant’s application and traverses.

The Advisory Action next states

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., more than one patterned) are not recited in the rejected claim(s). Although the claims are interpreted in

The meaning of the claim as *more than one* patterned is consistent, however, throughout the disclosure such that the meaning is clear from a plain reading of the text. This meaning is tied to the claim limitation of “*more than one* microelectronic die”. (E.G., Claim 1). Applicant is therefore not claiming something that is both taught and claimed.

The *more than one* patterned layer 104 is supported in FIG. 2 in the text at page 6, beginning at line 17 as it shows more than one layer 104 in a pattern to receive the more than one

microelectronic dice. The *more than one* patterned layer 104 is supported in FIG. 3 in the text at page 6, beginning at line 23 as it shows more than one layer 104 in a pattern to receive the more than one microelectronic dice. The *more than one* patterned layer 104 is supported in FIGs 6, 7, 10, and 11 in the text at page 7, beginning at line 13 as it shows more than one layer 104 in a pattern to receive the more than one microelectronic dice. The *more than one* patterned layer 104 is supported in FIG 24 as it shows more than one layer 104 in a pattern to receive the more than one microelectronic dice. Consequently, the plain meaning of the claimed embodiments is more than one patterned, which is supported consistently throughout Applicant's disclosure, and which is not taught alone or in combination in the cited references.

Claim 1 requires “a *patterned* thermally conductive adhesive layer disposed between said *more than one* microelectronic die and said heat sink”. (Emphases added).

The Office Action has created an *ad hoc*, circular definition of Chen's layer 33 as a “patterned adhesive layer”. Claim 1 discloses and represents “more than one ... patterned”. This means a “repeat patterned” because the claim also recites *more than one microelectronic device*. The *ad hoc* definition proffered by the Office, distorts the plain meaning of what is claimed in claim 1. Chen fails to teach or suggest this limitation. The U.S. Supreme Court recently reaffirmed that “[a] factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of argument reliant upon *ex post* reasoning.” *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 82 USPQ2d at 1397. *See also Graham v. John Deere Co.*, 383 U.S. at 36, 148 USPQ at 474.

The Response has taken the position the Applicant has attacked the references individually. (Office Action at page 11). But this is incorrect. Because all claim limitations must be shown in the *combined* references, this means *at least one* of the references must teach or suggest a limitation in question. *Neither* of Chen and Jimarez teach a more than one patterned layer. A mere response that the Office has asserted that Chen teaches a limitation, and Applicant's pointing out this is wrong, is not an attack on an individual reference.

Jimarez also has only a single adhesive 44, which by review of single adhesive 44 in Fig. 8 of Jimarez, cannot be “more than one patterned” within the meaning of what is claimed in claim 1. This is an assertion that neither reference teaches this limitation.

There is no teaching or suggestion in either Chen or Jimarez to combine reference teachings. Chen relates to packaging a wire-bond chip 31 to a substrate 34, which acts as an interposer of sorts, to make electrical contact with a metal ball 37. Jimarez relates to assuring electrical grounding within a package by coupling a chip 34 to a large body of electrically conductive adhesive 40. There is no teaching or suggestion in Chen to look to Jimarez to find an adhesive 44 in Jimarez. Jimarez also fails to teach an encapsulation material that is disposed both on the die active surface and the heat sink, as required in claim 1. The structure of Jimarez is significantly different from what is claimed, and its incidental occurrence of an adhesive 44 is neither taught or suggested in Chen. Withdrawal of the rejection is respectfully requested.

There is no expectation of success to achieve the enhanced heat dissipating of Chen, or the electrical grounding of Jimarez by their combination. This is because of their disparate endeavors in the technologies they teach. That Jimarez also does not have a patterned adhesive, Jimarez can only be combined with the teachings of Chen by using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

All the claims limitations are not taught in the cited references. Further, merely that the Office Action assembles a mosaic of elements to assert a rejection, does not mean all the claims limitations are taught within the standard of unobviousness. The standard of patentability requires "the subject matter as a whole" was not "obvious at the time the invention was made to a person of ordinary skill in the art . . . ." Jimarez also fails to teach an encapsulation material that is disposed on the die active surface and the heat sink, as required in claim 1. Applicant respectfully asserts that the combination of Chen with Jimarez cannot be made without using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Claim 29 was also rejected under 35 USC § 103(a) as being unpatentable over Chen et al. in view of Jimarez et al. and further in view of Woodward et al. (U.S. 4,731,700). The Applicant respectfully traverses the rejection and requests the Office to consider the following.

Applicant incorporates all the arguments above regarding the improper combination of Chen with Jimarez. The Office has admitted that "Chen et al. fails to disclose a microelectronic package core and wherein at least one die is disposed within at least one package core opening."

(Office Action at page 3). Woodward provides a radically different technology than either of Chen or Jimarez.

Applicant notes that structurally between Woodward's chip 16 and his heat sink 12 is a layer of molybdenum 12c that is not taught as an adhesive of any type. Rather, item 12c is simply referred to as a part of the heat sink 12. Woodward has the same failing as Chen et al. and Jimarez, that the layer 12c is not patterned. Further, Woodward is devoid of any teaching of an encapsulant that should increase indication of the impropriety of combination.

Because Woodward is solving wire routing problems by disposing some wiring 24 across the chip 16, and because Chen and Jimarez have significantly different technical challenges from each other and from Woodward, the combination of Chen and Jimarez with Woodward can only be reached by using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

There is no expectation of success to get a better pin-out for Chen by the application of Woodward, and there is no expectation of success to better ground the die in Woodward by the application of Jimarez. Withdrawal of the rejection is respectfully requested.

That the Office Action assembles a mosaic of elements to assert a rejection, does not mean all the claims limitations are taught within the standard of unobviousness. The standard of patentability requires "the subject matter as a whole" was not "obvious at the time the invention was made to a person of ordinary skill in the art . . . ." Applicant respectfully asserts that the combination of Chen and Jimarez with Woodward, creates a teaching that starts to drop out claimed elements, including a patterned thermally conductive adhesive. Applicant therefore respectfully asserts this combination cannot be made without using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Claims 1-4 were also rejected under 35 USC § 103(a) as being unpatentable over Eichelberger et al. (U.S. 5,250,843) in view of Jimarez et al.

The Office has admitted "Eichelberger fails to disclose a thin die attach material 16 is a patterned thermally conductive adhesive layer." Applicant notes Eichelberger's thin die attach material 16 is not more than one patterned as required by claim 1. Applicant further notes Eichelberger's encapsulant 18 is not disposed on the substrate 12, rather, it is disposed on the die

attach material 16. Therefore, Eichelberger's structure is not, nor cannot be construed to teach or suggest what is claimed. The Office Action looks to Jimarez to remedy what is missing in Eichelberger. But Jimarez also fails to teach an encapsulation material that is disposed on the die active surface and the heat sink, as required in claim 1.

Regarding claim 1, there is no teaching or suggestion in either Eichelberger or Jimarez to combine reference teachings to achieve the limits of claim 1. Eichelberger fails to teach patterned adhesive layer and an encapsulant that is disposed on both the heat sink and the die active surface. Jimarez relates to assuring electrical grounding within a package by coupling a chip 34 to a large body of electrically conductive adhesive 40. There is not teaching or suggestion in Eichelberger to look to Jimarez to find a patterned adhesive 44 in Jimarez. Withdrawal of the rejection is respectfully requested.

Regarding claim 1, there is also no expectation of success to achieve the structure of Eichelberger, or the electrical grounding of Jimarez by their combination. This is because of their disparate endeavors in the technologies they teach. That Jimarez may have a patterned adhesive 44 can only be combined with the teachings of Eichelberger by using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Regarding claim 1, merely that the Office Action assembles a mosaic of elements to assert a rejection, does not mean all the claims limitations are taught within the standard of unobviousness. The standard of patentability requires "the subject matter as a whole" was not "obvious at the time the invention was made to a person of ordinary skill in the art . . . ." Applicant respectfully asserts that the combination of Eichelberger with Jimarez cannot be made without using the Applicant's disclosure as a guide, and even if they could be combined properly, they do not teach all the claim elements as set forth above. Withdrawal of the rejection is respectfully requested.

Regarding claim 2, although Eichelberger may teach a build-up layer etc., because claim 2 depends from claim 1, all the claim limitations are not taught as set forth above. Withdrawal of the rejection is respectfully requested.

Regarding claim 3, although Eichelberger may teach a conductive trace etc., because claim 3 depends from claim 1, all the claim limitations are not taught as set forth above. Withdrawal of the rejection is respectfully requested.

Regarding claim 4, although Eichelberger may teach a second conductive trace etc., because claim 4 depends from claim 1, all the claim limitations are not taught as set forth above. Withdrawal of the rejection is respectfully requested.

Claim 29 was also rejected under 35 USC § 103(a) as being unpatentable over Eichelberger et al. in view of Jimarez et al. and further in view of Woodward et al. The Applicant respectfully traverses the rejection and requests the Office to consider the following.

The Office has admitted "Eichelberger fails to disclose a microelectronic package core and wherein at least one die is disposed within at least one package core opening." Applicant notes Eichelberger's thin die attach material 16 is not more than one patterned. Applicant further notes Eichelberger's encapsulant 18 is not disposed on the substrate 12, rather, it is disposed on the die attach material 16. But Jimarez also fails to teach an encapsulation material that is disposed on the die active surface and the heat sink, as required in claim 1. This deficiency is made clear in the figures of Jimarez, where the die, e.g. die 36 is first underfilled 38, then encapsulated 42, such that the encapsulation material is decidedly not disposed on the die active surface and the heat sink, as required in the claims. Jimarez also fails to teach a patterned layer as required in claim 1.

Applicant notes that structurally between Woodward's chip 16 and his heat sink 12 is a layer of molybdenum 12c that is not taught as an adhesive of any type. Rather, item 12c is simply referred to as a part of the heat sink 12.

Because Woodward is solving wire routing problems by disposing some wiring 24 across the chip 16, and because Eichelberger and Jimarez have significantly different technical challenges from each other and from Woodward, the combination of Eichelberger and Jimarez with Woodward can only be reached by using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

There is no expectation of success to get a better pin-out for Eichelberger by the application of Woodward, and there is no expectation of success to better ground the die in Woodward by the application of Jimarez. Withdrawal of the rejection is respectfully requested.

Merely that the Office Action assembles a mosaic of elements to assert a rejection, does not mean all the claims limitations are taught within the standard of unobviousness. The

standard of patentability requires "the subject matter as a whole" was not "obvious at the time the invention was made to a person of ordinary skill in the art . . . ." Applicant respectfully asserts that the combination of Eichelberger and Jimarez with Woodward, creates a teaching that starts to drop out claimed elements, including a patterned thermally conductive adhesive. Applicant therefore respectfully asserts this combination cannot be made without using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Claims 10, 15 and 16 were also rejected under 35 USC § 103(a) as being unpatentable over Shen (U.S. 6,368,894) in view of Woodward et al. The Applicant respectfully traverses the rejection and requests the Office to consider the following.

The Reply by the Office, that "one of ordinary skill would have readily modified the structure of Shen by replacing the mounting chip 2 with Eichelberger's structure 18, 20, 24 and 26" is a tacit admission the Office has used impermissible hindsight to assemble this mosaic of references. The Office has failed to address Applicant's assertion the combination destroys and renders impossible the structures taught by Shen.

Merely stating the negative of the Applicant's conclusion that the structure is rendered impossible, is no rebuttal. The Office must meet the burden of rebuttal; a mere conclusion to the contrary is no rebuttal.

Regarding the combination of Shen and Woodward, Shen and Woodward cannot be combined because there is no location for Woodward's structure 14 between Shen's semiconductor chip 2 and second semiconductor chip 3. Therefore, the application of Woodward to Shen, destroys and renders impossible the structures taught by Shen. Any modification of Woodward's structure to be accommodated by Shen can only come by using the Applicants' disclosure as a guide because it is not found in the prior art. Withdrawal of the rejection is respectfully requested.

Regarding claim 15, the Office stated "Woodward et al. disclose a thickness of the ceramic member 14 is greater than a thickness of at least one die 16." (Office Action at page 7). This statement reinforces Applicant's assertion that the combination of Woodward with Shen destroys the teaching of Shen. First, using Woodward's ceramic 14 with a thickness greater than

the chip 16 amounts to increasing the vertical profile of Shen. This defeats the low-profile geometry of Shen. Second, Woodward's ceramic 14 is disposed upon a heat sink 12, and there is no equivalent location to place any such structure upon a heat sink in Shen. Because the motivation for such a teaching or modification comes from Applicants' disclosure, and not from the cited references, withdrawal of the rejection is respectfully requested.

Regarding claim 16, the Office asserted Shen discloses the package core is a material selected from the group consisting of ceramics or metals. As set forth above, the importation of Woodward into Shen, destroys and renders impossible the structures taught by Shen. Because the combination of Woodward with Shen does not amount to the limitations of claim 16, withdrawal of the rejection is respectfully requested.

Claims 11-14 were also rejected under 35 USC § 103(a) as being unpatentable over Shen in view of Woodward et al. and further in view of Eichelberger et al. The Applicant respectfully traverses the rejection and requests the Office to consider the following.

There appears to be no rebuttal, neither an attempted proffered rebuttal to the Applicant's previous traversal of this rejection with respect to claims 11-14. The Office has failed to address Applicant's assertion the combination destroys and renders impossible the structures taught by Shen.

Merely stating the negative of the Applicant's conclusion that the structure is rendered impossible, is no rebuttal. The Office must meet the burden of rebuttal; a mere conclusion to the contrary is no rebuttal.

The Office has admitted "Shen and fails to disclose a build up layer disposed on an upper surface of the encapsulation material." Applicant incorporates all the arguments regarding the impropriety of combining Shen with Woodward. Applicant further notes that the combination of Shen with Eichelberger creates the same dilemma as the combination of Shen with Woodward.

Regarding the combination of Shen and Eichelberger, Shen and Eichelberger cannot be combined because there is no location for Eichelberger's structures 18, 20, 24, and 26 between Shen's semiconductor chip 2 and second semiconductor chip 3. Therefore, the application of Eichelberger to Shen, destroys and renders impossible the structures taught by Shen, and as set forth above, Woodward also destroys the structure of Shen. Any modification of Eichelberger's



structure to be accommodated by Shen can only come by using the Applicants' disclosure as a guide because it is not found in the prior art. Withdrawal of the rejection is respectfully requested.

Regarding claim 11, although the Office has asserted Eichelberger discloses the build up layer as set forth above, the importation of Eichelberger into Shen, destroys and renders impossible the structures taught by Shen, and as set forth above, Woodward also destroys the structure of Shen. Because the combination of Eichelberger with Shen and Woodward does not amount to the limitations of claim 11, withdrawal of the rejection is respectfully requested.

Regarding claim 12, although the Office has asserted Eichelberger discloses the build up layer and at least "on (sic) conductive trace 20", as set forth above the importation of Eichelberger into Shen, destroys and renders impossible the structures taught by Shen, and as set forth above, Woodward also destroys the structure of Shen. Because the combination of Eichelberger with Shen and Woodward does not amount to the limitations of claim 12, withdrawal of the rejection is respectfully requested.

Regarding claim 13, although the Office has asserted Eichelberger further includes "at least one dielectric layer 24", as set forth above the importation of Eichelberger into Shen, destroys and renders impossible the structures taught by Shen, and as set forth above, Woodward also destroys the structure of Shen. Because the combination of Eichelberger with Shen and Woodward does not amount to the limitations of claim 13, withdrawal of the rejection is respectfully requested.

Regarding claim 14, although the Office has asserted Shen discloses the encapsulation (34 and 24) covers the package core first surface, as set forth above the importation of Eichelberger into Shen, destroys and renders impossible the structures taught by Shen, and as set forth above, Woodward also destroys the structure of Shen. Because the combination of Eichelberger with Shen and Woodward does not amount to the limitations of claim 14, withdrawal of the rejection is respectfully requested.

Claim 17 was also rejected under 35 USC § 103(a) as being unpatentable over Shen (U.S. 6,368,894) in view of Jimarez et al. and Woodward et al. The Applicant respectfully traverses the rejection and requests the Office to consider the following.

The Office has admitted "Shen fails to disclose a patterned thermally conductive adhesive layer." Applicant respectfully asserts the combination of Shen with Woodward cannot be made. The board 10 and solder ball connector 48 in Jimarez, destroys the structure of Shen. The board 10 and solder ball connector 48 in Jimarez are for mounting against a printed wiring board (Jimarez at column 3, lines 34-39), not another chip as in Shen.

Applicant incorporates all the arguments regarding the impropriety of combining Jimarez with Woodward as set forth above, and therefore respectfully requests withdrawal of the rejection. Jimarez also fails to teach an encapsulation material that is disposed on the die active surface and the heat sink, as required in claim 1. This deficiency is made clear in the figures of Jimarez, where the die, e.g. die 36 is first underfilled 38, then encapsulated 42, such that the encapsulation material is decidedly not disposed on the die active surface and the heat sink, as required in the claims.

Regarding the combination of Jimarez with Shen, Applicant notes that there is no teaching or suggestion in Shen to include a patterned adhesive, or any adhesive for that matter, between Shen's metal heat dissipating plates 23 and 33, and their respective chips 2 and 3. The combination of Shen with Jimarez can only be achieved by using Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

### **RESERVATION OF RIGHTS**

In the interest of clarity and brevity, Applicant may not have addressed every assertion made in the Office Action. Applicant's silence regarding any such assertion does not constitute any admission or acquiescence. Applicant reserves all rights not exercised in connection with this response, such as the right to challenge or rebut any tacit or explicit characterization of any reference or of any of the present claims, the right to challenge or rebut any asserted factual or legal basis of any of the rejections, the right to swear behind any cited reference such as provided under 37 C.F.R. § 1.131 or otherwise, or the right to assert co-ownership of any cited reference. Applicant does not admit that any of the cited references or any other references of record are relevant to the present claims, or that they constitute prior art. To the extent that any rejection or assertion is based upon the Examiner's personal knowledge, rather than any objective evidence of record as manifested by a cited prior art reference, Applicant timely objects to such reliance

on Official Notice, and reserves all rights to request that the Examiner provide a reference or affidavit in support of such assertion, as required by MPEP § 2144.03. Applicant reserves all rights to pursue any cancelled claims in a subsequent patent application claiming the benefit of priority of the present patent application, and to request rejoinder of any withdrawn claim, as required by MPEP § 821.04.

### **CONCLUSION**


Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (801) 278-9171 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.  
P.O. Box 2938  
Minneapolis, Minnesota 55402  
(801) 278-9171

By

  
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John N. Greaves  
Reg. No. 40,362